



Oxford Read and Discover

Materials To Products

Alex Raynham

Read and discover all about the materials that people use to make products ...

- How is glass made?
- What are microchips?

Read and discover more about the world!

This series of non-fiction readers provides interesting and educational content, with activities and project work.

Series Editor: Hazel Geatches

Audio CD Pack available

Word count for this reader: 3,437



Level 3
600 headwords



Level 4
750 headwords



Level 5
900 headwords



Level 6
1,050 headwords

Cover photograph: Photolibrary (Iron and Steel Factory/Yang Liu/Redlink - Asian Photography)

OXFORD
UNIVERSITY PRESS

www.oup.com/elt



ISBN 978-0-19-464505-0



9 780194 645050



Oxford Read and Discover



Materials To Products





Materials To Products

Alex Raynham

Contents

Introduction	3
1 The First Materials	4
2 Rocks and Minerals	8
3 Glass and Concrete	12
4 Materials That We Grow	16
5 Incredible Oil	20
6 New Materials	24
7 Finding Materials	28
8 In the Future	32
Activities	36
Projects	52
Glossary	54
About Read and Discover	56

OXFORD

UNIVERSITY PRESS

Great Clarendon Street, Oxford OX2 6DP

Oxford University Press is a department of the University of Oxford. It furthers the University's objective of excellence in research, scholarship, and education by publishing worldwide in

Oxford New York

Auckland Cape Town Dar es Salaam Hong Kong Karachi
Kuala Lumpur Madrid Melbourne Mexico City Nairobi
New Delhi Shanghai Taipei Toronto

With offices in

Argentina Austria Brazil Chile Czech Republic France
Greece Guatemala Hungary Italy Japan Poland Portugal
Singapore South Korea Switzerland Thailand Turkey
Ukraine Vietnam

OXFORD and OXFORD ENGLISH are registered trade marks of Oxford University Press in the UK and in certain other countries

© Oxford University Press 2011

The moral rights of the author have been asserted

Database right Oxford University Press (maker)

First published 2011

2015 2014 2013 2012 2011

10 9 8 7 6 5 4 3 2 1

No unauthorized photocopying

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, without the prior permission in writing of Oxford University Press, or as expressly permitted by law, or under terms agreed with the appropriate reprographics rights organization. Enquiries concerning reproduction outside the scope of the above should be sent to the ELT Rights Department, Oxford University Press, at the address above.

You must not circulate this book in any other binding or cover and you must impose this same condition on any acquirer

Any websites referred to in this publication are in the public domain and their addresses are provided by Oxford University Press for information only. Oxford University Press disclaims any responsibility for the content

ISBN: 978 0 19 464505 8

An Audio CD Pack containing this book and a CD is also available, ISBN 978 0 19 464545 4

The CD has a choice of American and British English recordings of the complete text.

An accompanying Activity Book is also available,
ISBN 978 0 19 464515 7

Printed in China

This book is printed on paper from certified and well-managed sources.

ACKNOWLEDGEMENTS

Illustrations by: Kelly Kennedy pp.8, 11, 17, 25; Roger at KJA Artists p.4; Alan Rowe pp.36, 42, 44, 49; Jane Smith pp.10, 20; The Publishers would also like to thank the following for their kind permission to reproduce photographs and other copyright material: Agpix.com p.30 (Gerald Cubitt/Photographers Direct); Alamy pp.5 (AfriPics.com/hut), 7 (Petr Svarc/pyramids), 14 (Gianni Dagli Orti/The Art Archive/pantheon, Kevin Britland/concrete mixer), 16 (Vespasian), 22 (Alex Segre), 23 (Dinodis Images/parachute); Alex Raynham p.23 (painting in acrylics); The Bridgeman Art Library p.9 (Late Victorian multi-gem set butterfly brooch, c.1880 (precious stones), Private Collection© DACS/Photo © Bonhams, London, UK/The Bridgeman Art Library); Corbis p.10 (Peter Ginter/Terra), 11 (Bettmann), 12 (Gregor M. Schmid), 31 (Kevin Schafer/salt pools, Michael S. Yamashita/gold panning); Getty Images pp.9 (Carsten Peter/Speleoresearch & Films/Cave of the Crystals), 13 (Robyn Beck), 15 (Reza Estakhrian/Riser/building site), 18 (Ken Whitemore/Stone), 19 (Stefano Scata/Stone/pearl in oyster), 26 (Bloomberg); Dr. Mitchell Joachim, Terreform ONE + Terrefuge p.34; Oxford University Press pp.3, 7 (sword), 17, 21; Photoflribrary pp.5 (G. Richardson/Robert Harding Travel/fisherman), 6 (Sergio Pitamitz/age footstock), 8 (Kevin Schafer/age footstock), 19 (Joachim E Röttgers/imagebroker.net/collecting rubber), 28 (Keith Douglas/All Canada Photos); PA Images p.15 (Mate Nandorfi/AP/Press Association Images/transparent concrete); Philips p.33 (Lumalive/Philips); Reuters p.29 (Jessica Rinaldi); Science Photo Library pp.24 (Astrid & Hans Frieder Michler), 25 (Kevin Curtis), 27 (US Department of Energy), 32 (Erik Viktor), 35 (Pascal Goetgheluck).

With thanks to Ann Fullick for science checking.

With special thanks to the author for allowing us to reproduce the acrylic painting on page 23.



Introduction

Products are things that people make or use, like this book, your clothes, and the television in your home. People make products from different materials, like wood, metal, and plastic.

What products can you see here?

What products can you see around you?

What materials are they made of?



Now read and discover more about the materials that people use to make products!



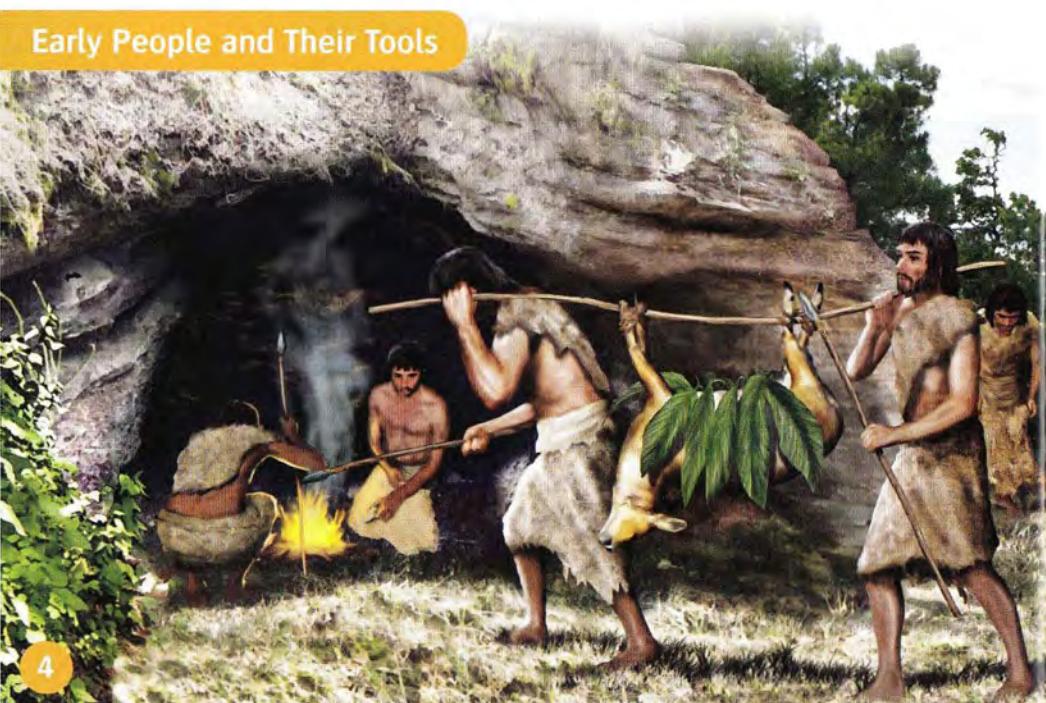
The First Materials

A very long time ago, people didn't build homes. They slept in forests and caves, hunted animals, and collected fruit. They also made things from materials that they found around them. What did they make, and what materials did they use?

Flint and Fur

People made the first tools from a stone called flint. They used the flints in their hands or they fixed them to pieces of wood or animal bones. People used flint tools to cut wood and to hunt animals. In cold countries, they used animal fur to make clothes and shoes.

Early People and Their Tools





Houses Made of Wood and Plants, Mozambique

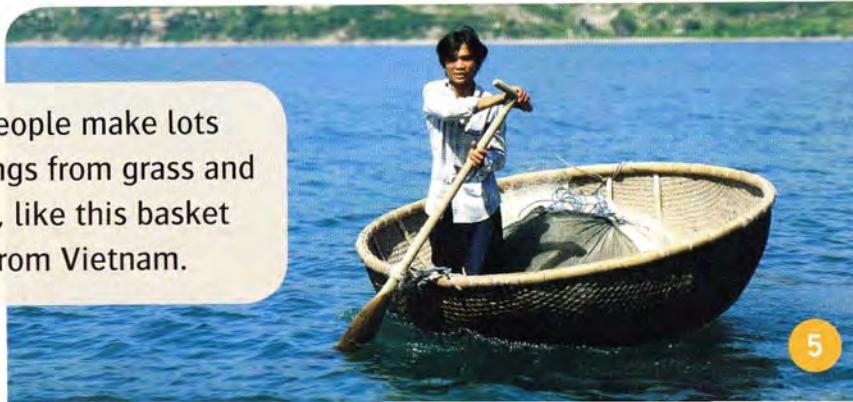
Wood and Plants

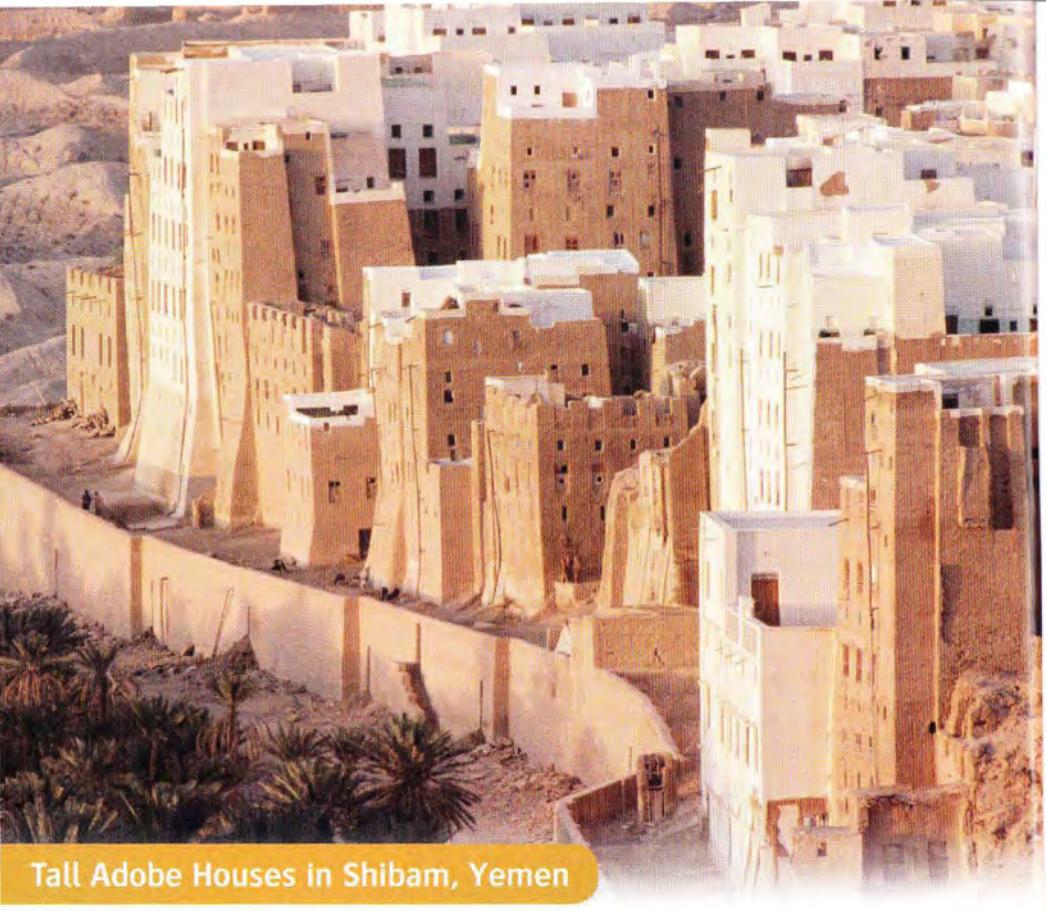
People used wood and plants to make shelters – simple places to sleep in. They cut wood from trees to make the shape of the shelter. Then they used other plants to make the roof and the walls. Some people still make homes like this today.

People used grass to make threads. They pushed threads over and under other threads to make clothes and beds. This is called weaving. They also made baskets by weaving thin sticks. Baskets are great for carrying food and catching fish.



People make lots of things from grass and sticks, like this basket boat from Vietnam.



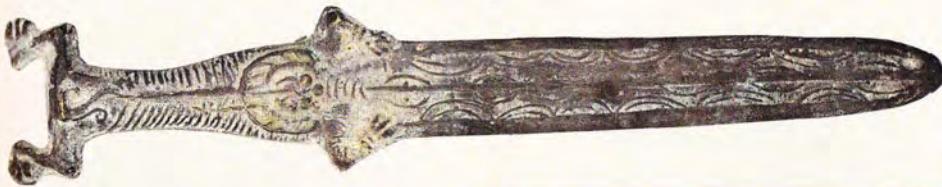


Tall Adobe Houses in Shibam, Yemen

Clay

About 10,000 years ago, people mixed sand and grass with a type of soil called clay to make a material called adobe. They put the adobe into molds and left it to dry. Adobe becomes very hard in the sun. People used adobe bricks to build the first houses. In many hot countries, people still build adobe houses today.

People also learned how to make shapes from clay. They put the clay shapes into a fire to make pottery. Pottery can hold water so it's great for cooking and keeping food.



A Bronze Weapon from China

Bronze and Iron

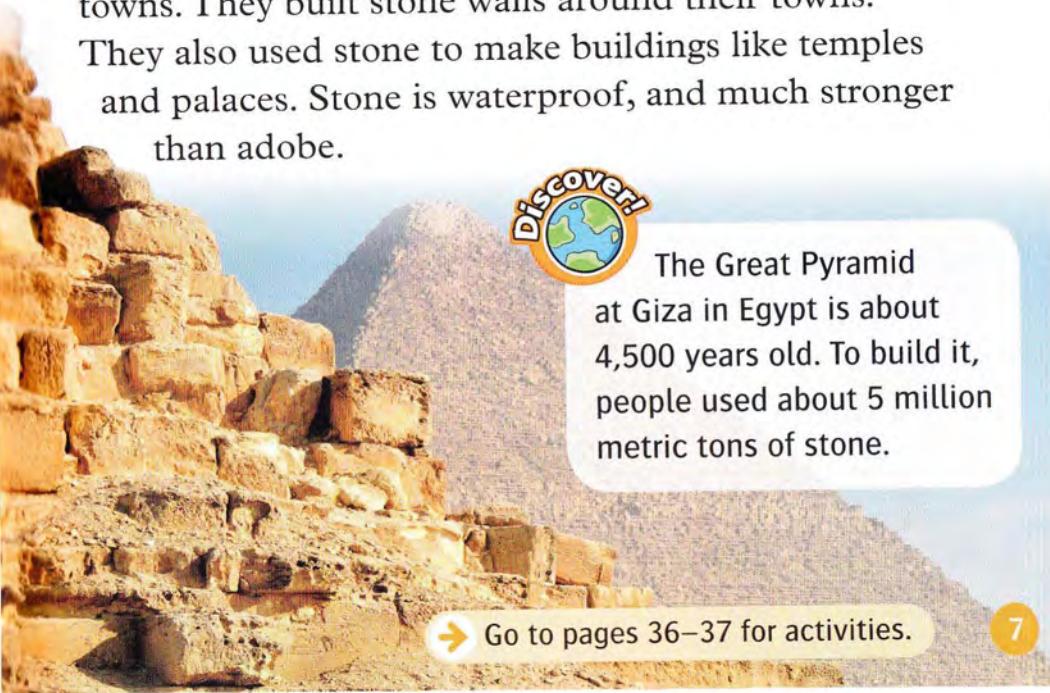
Some rocks have metals in them. About 8,500 years ago, people discovered how to use a process called smelting to get metals out of rocks. The first metals, like gold, were very soft. Then people mixed two metals together to make a hard metal called bronze. They used bronze to make tools and weapons. Later, they used another metal called iron.

Stone

About 5,000 years ago, people started to live in big towns. They built stone walls around their towns. They also used stone to make buildings like temples and palaces. Stone is waterproof, and much stronger than adobe.



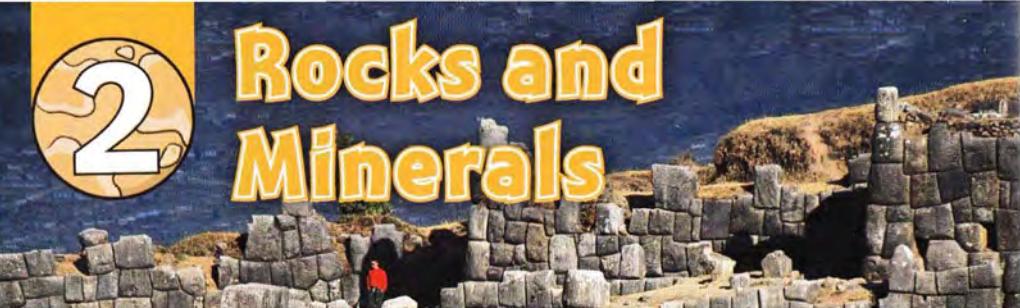
The Great Pyramid at Giza in Egypt is about 4,500 years old. To build it, people used about 5 million metric tons of stone.



→ Go to pages 36–37 for activities.



Rocks and Minerals



The ground is made of rocks. In rocks there are chemicals called minerals that make the rocks different colors. What do people use rocks and minerals for?



Stone Walls of Sacsahuaman, Peru

Stone

Stone comes from rocks. About 600 years ago, the Inca people built their cities from stone. They used triangles of wood called wedges to break rocks into huge pieces of stone. Hundreds of people used long, round pieces of wood to move the stone.



To build the Inca city of Sacsahuaman, people moved huge pieces of stone to the top of a hill. Some pieces were more than 50 metric tons!



Gems

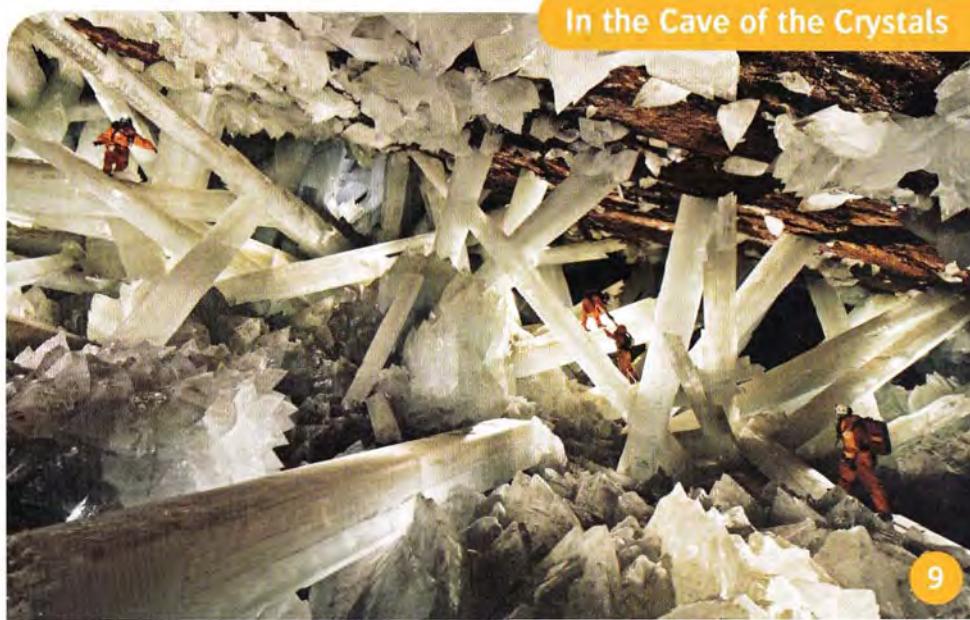
For thousands of years people have collected pretty stones called gems. Gems are minerals, and they can be many different colors – rubies are red, and emeralds are green. Some gems, like diamonds, are transparent – they don't have any color. The prettiest gems are very expensive. People make beautiful jewelry from gems and metals. In the past, artists used some gems to make colors for paints.



Crystals

Some gems, like diamonds, are also crystals. Crystals are made of stones that always have a regular shape. Some crystals are transparent. Some are very big, like these huge crystals in Mexico.

In the Cave of the Crystals



Metals

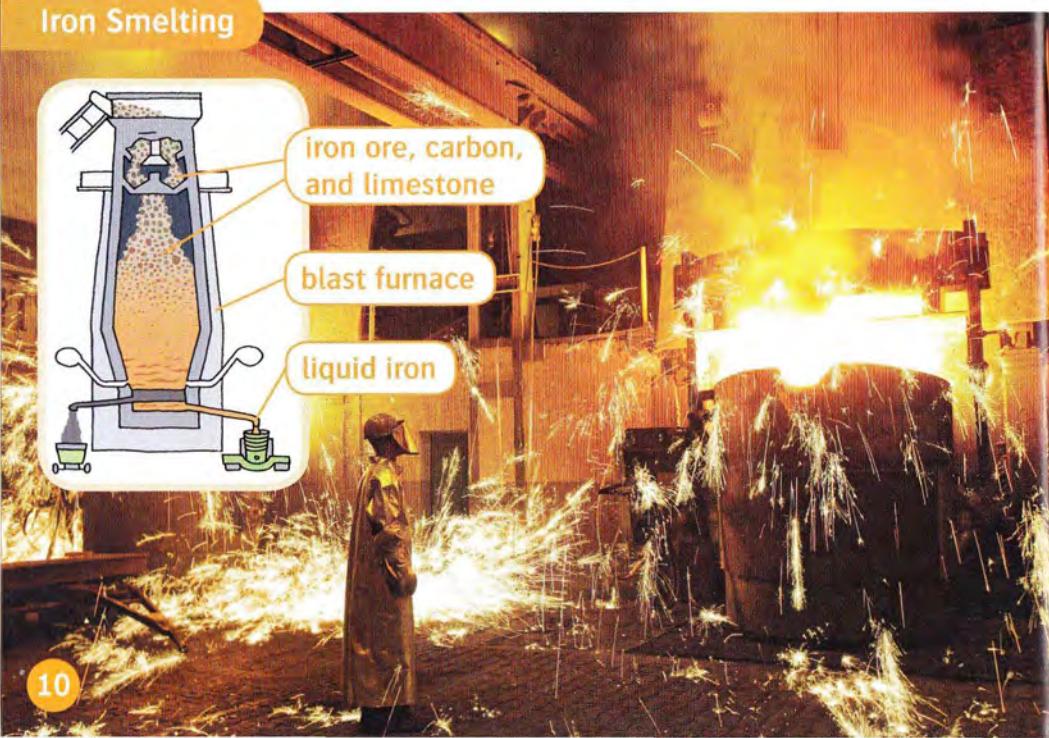
Ores are rocks that have minerals in them, like metals. Metal ores are a mixture of metals and other chemicals. People get metals from ores by using a process called smelting.

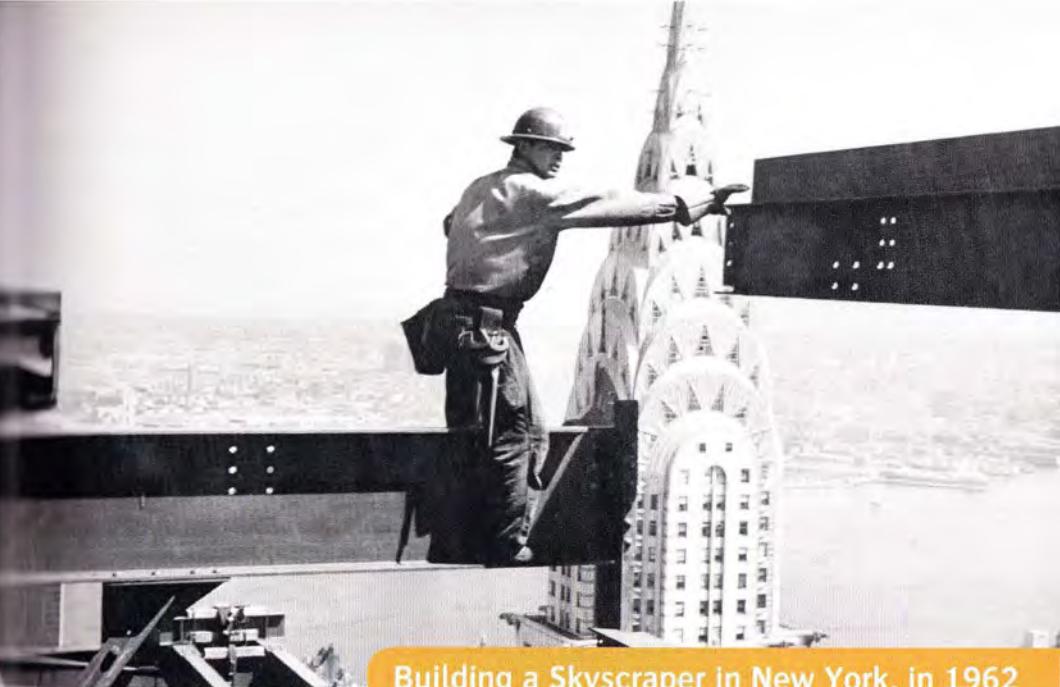
During iron smelting, people put iron ore, a chemical called carbon, and a stone called limestone into a very hot place called a blast furnace. At 2,000 degrees centigrade, the carbon and limestone take the other chemicals from the ore, and iron is made. The iron is a hot liquid, and it becomes hard when it cools.

People made iron tools for hundreds of years.

Today, people mix liquid iron with other chemicals to make a stronger metal called steel.

Iron Smelting





Building a Skyscraper in New York, in 1962

People make things from lots of different metals, but many things are made of steel, aluminum, and copper. Steel is very strong, so people use it to build cars and very tall buildings called skyscrapers. Aluminum is strong, too, and it's lighter than steel. People use it to make things like drinks cans and planes. Copper is a soft metal. Electricity can go through copper easily, so people use it to make electrical parts.



People can use copper to make statues. There are more than 80 metric tons of copper in the Statue of Liberty in New York.



Go to pages 38–39 for activities.



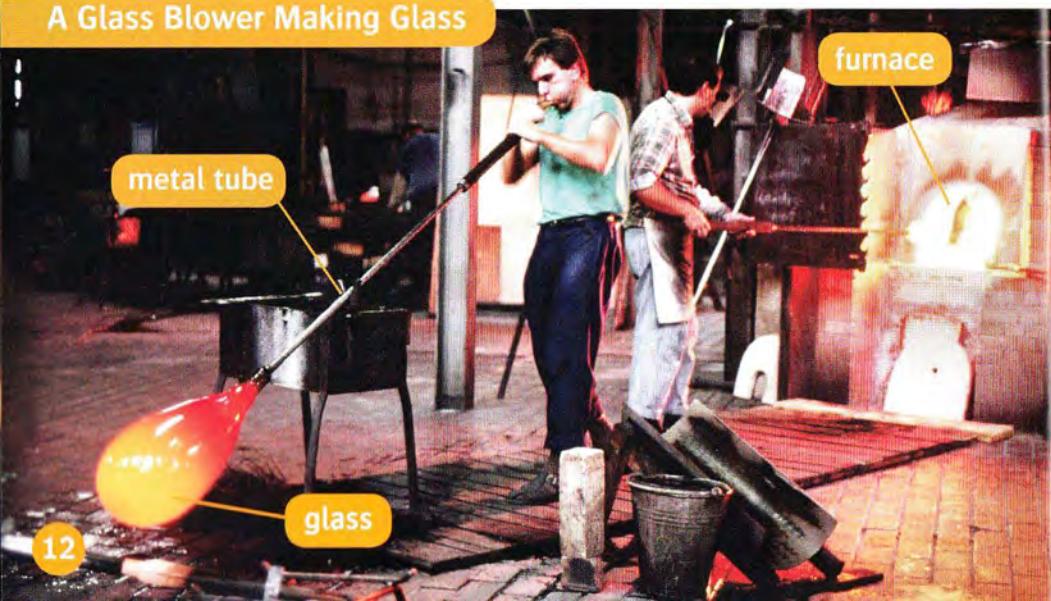
Glass and Concrete

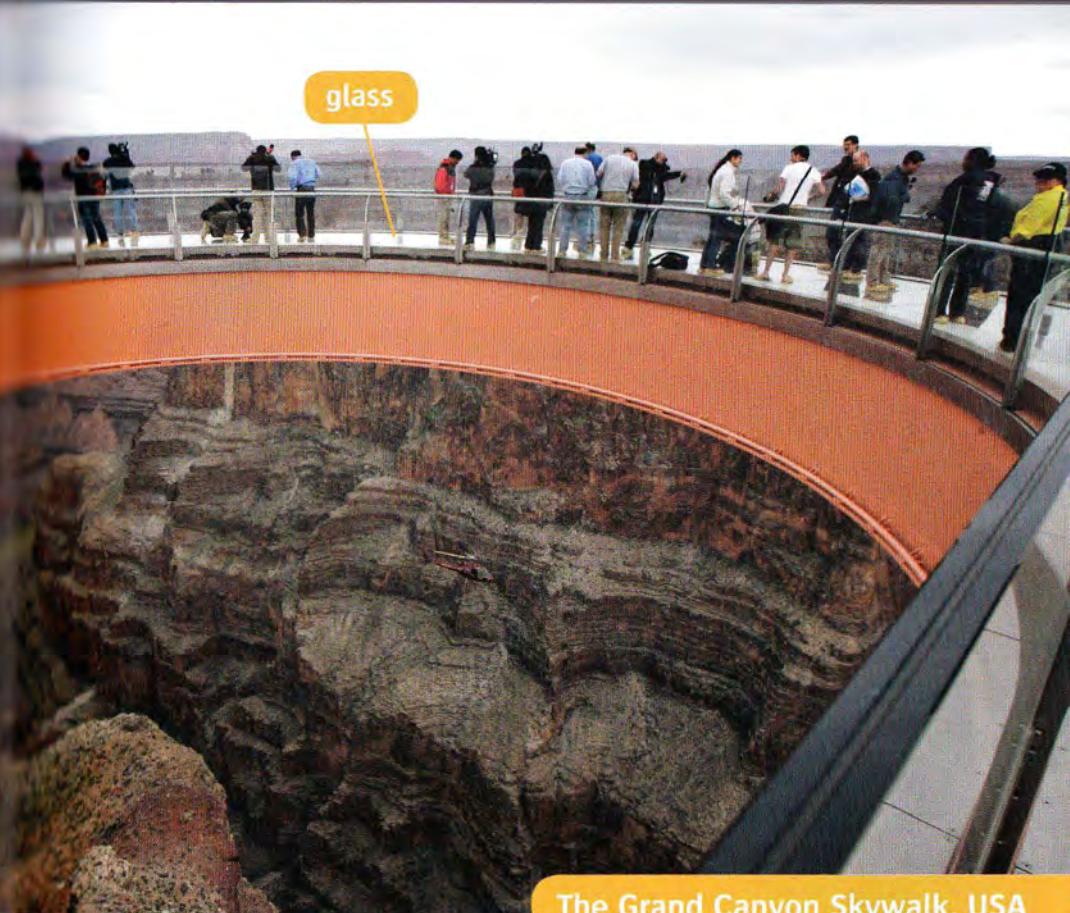
Tiny pieces of materials are called grains. People can make a lot of things from grains of rock, soil, or sand. For example, they can make glass and concrete.

Glass

The grains of sand on many beaches are made of a mineral called silica. To make glass, people put silica and other chemicals into a furnace. At 1,500 degrees centigrade, the mixture becomes hot, liquid glass. In the past, people called glass blowers blew air through a long, metal tube into the liquid glass to make glass things. Today most glass is made by machines, but some people still blow glass. They mix colors with glass to make beautiful things.

A Glass Blower Making Glass

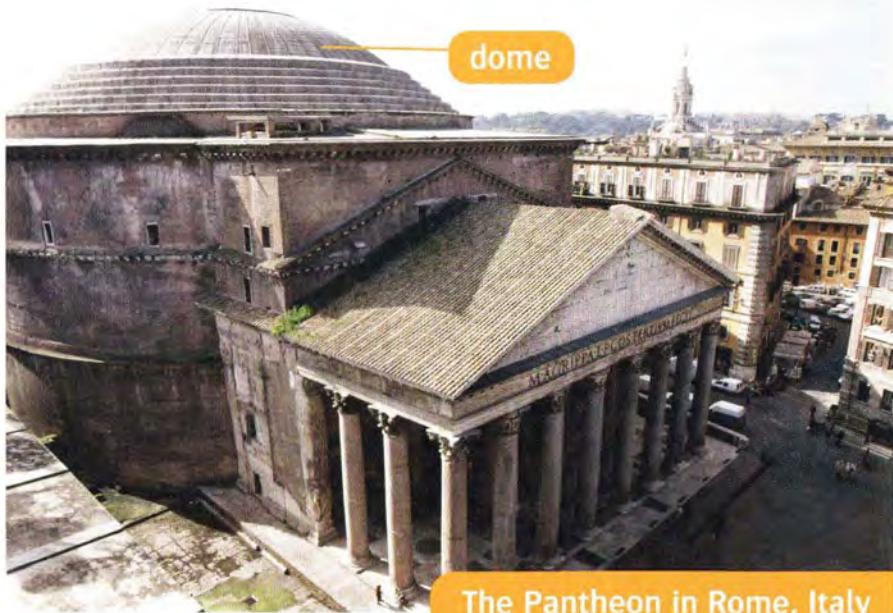




The Grand Canyon Skywalk, USA

From about 1900, people invented new ways to make things like flat, glass windows. Today there are lots of types of glass. The glass in some sunglasses becomes darker in the sun, and lighter in a room. Some glass is very strong. At the Grand Canyon Skywalk in Arizona in the USA you can walk on glass!

Long, thin fibers of glass are called fiberglass. People can mix fiberglass with plastic to make things like boats. Fiberglass is good for insulating things – hot and cold don't go through fiberglass. People use it in special clothes for very hot or cold places.



The Pantheon in Rome, Italy

Concrete

Cement is a material that's made by heating grains of rock and clay. When people mix cement with water, sand, and stones, it becomes a liquid called concrete. After a few hours, crystals grow inside the concrete and it becomes a solid material.

About 2,000 years ago, the Ancient Romans used concrete to make beautiful buildings, like the Pantheon – the dome is made of concrete.

Later, people forgot how to make concrete for more than 1,000 years!

Modern concrete was invented in 1756. Today, it's the world's most important building material.

Concrete becomes hard very quickly, so machines only make the concrete when people need it.



Liquid Concrete



Building with Reinforced Concrete

To make concrete stronger, people put long pieces of steel in it. This is called reinforced concrete.

Many of the world's tallest skyscrapers are made of reinforced concrete. Huge machines called pumps move liquid concrete hundreds of meters above the ground.

Today, there are many different types of concrete. Waterproof concrete is great for building bridges. Another type of concrete has materials in it that take dangerous chemicals from the air. In the future, this will help to make cities cleaner.



When concrete is mixed with glass it becomes transparent.



Go to pages 40–41 for activities.

4

Materials That We Grow

Farmers grow plants and raise farm animals to collect materials from them. People even grow materials in the ocean. What do we produce from these materials?

Cotton

Cotton comes from the flowers of the cotton plant. Farmers grow the plants and collect round pieces of cotton from them. People use machines to wash the cotton and to pull it into long strings called fibers. Then machines spin the fibers into cotton threads. Other machines weave cotton threads into fabric. People use the fabric to make lots of things, like clothes and curtains. People can use special colors called dyes to make the fabric different colors.

Weaving Cotton Threads into Fabric





Shearing Sheep

Wool

Wool comes from sheep and other animals. Sheep grow a coat of wool to keep them warm. Once a year, farmers cut the wool off the sheep. This is called shearing. Farmers can collect the wool from hundreds of sheep in one day!

People pull wool into fibers and spin it. This usually happens in factories, but some people still spin wool at home. Wool is very soft and warm, so it's great for making sweaters and socks.



We can also get wool from animals like llamas, goats, and rabbits.





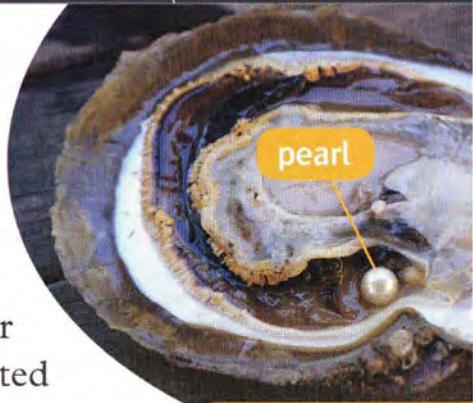
Paper

People made the first paper from small plants, but now they make most paper from trees. At a factory, people mix small pieces of wood with chemicals and water to make a liquid called pulp. Later, machines make the pulp flat, then they heat it to make it dry. Then, long pieces of paper come out of a machine and go onto a roll.

We print on paper to make books, and we fix paper together to produce cardboard, for making boxes. We should not waste paper because we cut down trees to make it, and it's bad to cut down too many trees. We can reuse old paper to make new things, for example, newspapers or even materials for building things.

Pearls

Oysters are animals that live in the ocean. Oysters produce beautiful pearls when things like grains of sand get into their shell. In the past, people collected and destroyed hundreds of oysters to find one pearl. Now we grow pearls by putting small pieces of shell inside the oyster's shell.



An Oyster Shell

Collecting Rubber



Rubber

Natural rubber comes from rubber trees. When farmers cut the tree, it produces liquid rubber. People mix rubber with chemicals to make things like waterproof boots and tires. Many rubber products are made from synthetic rubber that comes from chemicals, but natural rubber is better for our world.



About 3,500 years ago, the Mayan people of Central America played sport with natural rubber balls!



Go to pages 42–43 for activities.

5

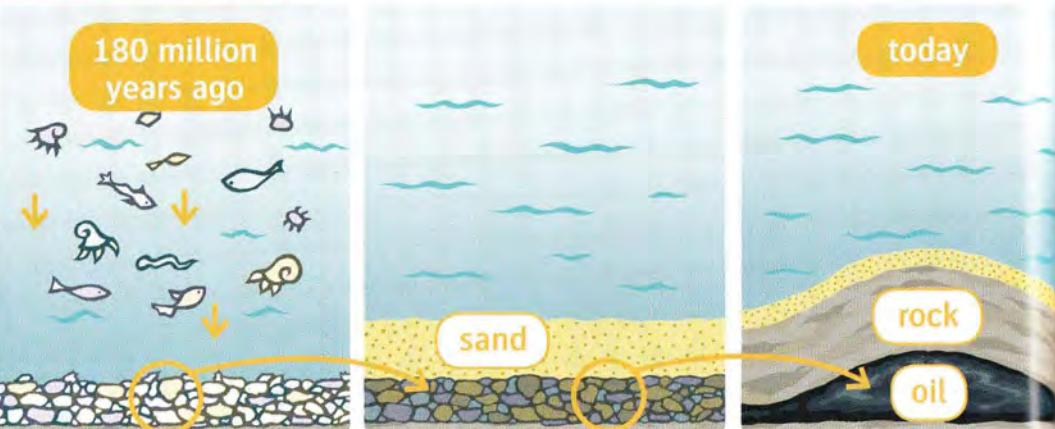
Incredible Oil

Sneakers, plastic toys, plastic shopping bags, and lots of other things are made from chemicals that come from oil. How are they made, and where does oil come from?

Oil and Natural Gas

Oil is made from tiny plants and animals that lived in the seas and oceans millions of years ago. After they died, the sand above them slowly became rock. The rock and heat under the ground changed them into a black liquid called oil, and a gas called natural gas.

How Oil Is Made



It takes millions of years to make oil, but we are using it very fast. In a hundred years, there won't be any oil if we don't use it more slowly.



An Oil Refinery

We can't use oil from the ground because it's a mixture of different chemicals. At an oil refinery, people heat oil until the different chemicals in the oil become a gas. These chemicals become liquids again at different temperatures, so people can collect different chemicals when the gas cools. Then people can use them.

People use some chemicals from oil to burn as fuels, like gasoline for cars. Other chemicals are made into new chemicals called petrochemicals. We use petrochemicals to make lots of different products. For example, petrochemical fertilizers help plants to grow, petrochemical detergents clean things, and cosmetics make your skin look nice. We use a lot of oil when we make these things.

Plastics

Plastics are materials that people make from chemicals. Most plastics are made from petrochemicals from oil. Some plastic objects are hard, but others are soft. Some plastics are fibers or liquids. People use plastics to make lots of different products.

We can put hot, liquid plastics into a mold. The plastic cools and becomes an object with the same shape as the mold. This is how we make toys and plastic bottles. Plastic shopping bags are made from a plastic called polythene. People throw away a lot of polythene waste. That's bad because scientists think it could take hundreds of years for polythene to decompose!

Plastic Products



Nylon

Nylon is a soft plastic. It was invented in 1935. We can put nylon into molds to make sneakers.

We make fibers out of nylon, too. People weave them with cotton or wool to make different types of clothes. Nylon fibers are very strong, so we use nylon to make parachutes.

Acrylic

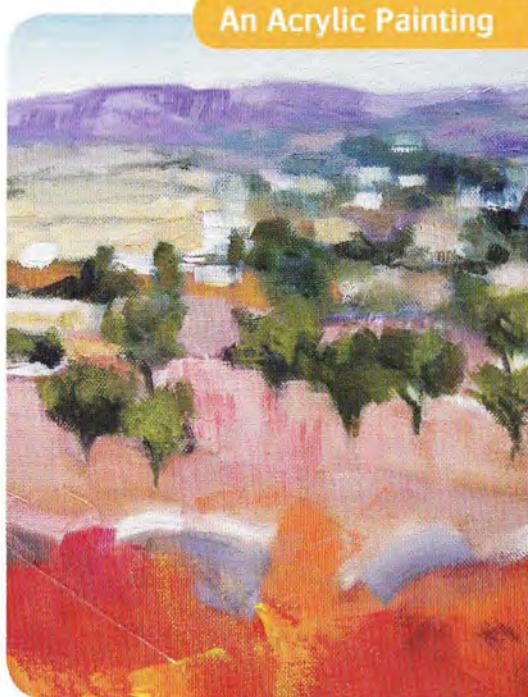
People use a type of plastic called acrylic to make paints. When acrylic paints are wet, you can mix them with water. When they're dry, they become waterproof.

We use acrylic for lots of other things, like the windows in planes and the fur on teddy bears.

A Nylon Parachute



An Acrylic Painting



Go to pages 44–45 for activities.

6

New Materials

People are making new materials all the time. We use them to make bigger planes, warmer clothes, thinner televisions, and products that are better for our world.

Part of a Microchip

Silicon

Microchips are electrical parts that control computers. People make them from silicon, a material that we get from silica, in sand. To make microchips, machines use chemicals to put tiny electrical parts onto pieces of silicon. When computers work, electricity goes through these parts.

Before microchips, electrical parts were very big. The first computers were as big as a room! Modern computers are very small because we can put millions of electrical parts onto one microchip. Microchips are used in cars, televisions, washing machines, and many other things that we use every day.



Fiber-Optic Cables

Fiber-Optic Cables

Fiber-optic cables are long, plastic tubes with transparent fibers inside. The fibers are made of glass or plastic, and light can travel through them. We use fiber-optic cables to send signals like television pictures and phone calls around the world. Doctors use fiber-optic cables with cameras to look inside people's bodies.

Liquid Crystals

Liquid crystals are like liquids, but electricity makes the minerals inside them move. This makes the liquid crystals change color. People use liquid crystals to make pictures on LCD televisions and computer screens.



Liquid crystal glass is transparent when electricity goes through the glass. When you turn off the electricity, you can't see through it!

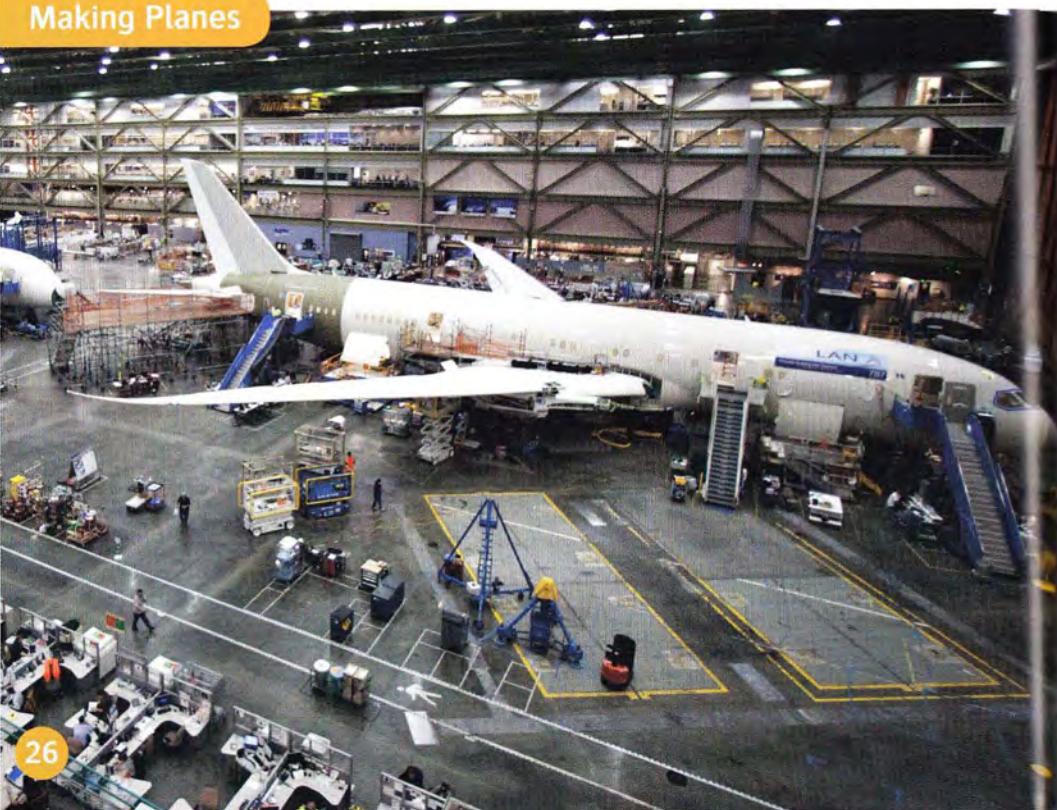


Composite Materials

Materials have different properties, like being strong or transparent. Composite materials are made by weaving, using molds, or fixing two materials together. They have the best properties of both materials. Composite materials are very light and very strong, so we use them to make things like fishing rods, tennis rackets, and planes.

Some composite materials are made of plastic, glass, or metal fibers. You can weave them into special clothes. Some of these clothes are stronger than steel. They protect police officers from people with weapons, and they protect firefighters from fires.

Making Planes





Silica Aerogel

Aerogels

Aerogels are made from chemicals like silica and carbon. Silica aerogel is the lightest material in the world. It's difficult to see because it's 99.8% air! Hot and cold don't go through aerogel, so people use it to insulate things like windows, machines, and special clothes for astronauts.

Recycled Materials

It's bad for our world to throw away too many things. This uses energy and materials, and produces waste. It's good to recycle as much waste as possible. Then in factories, people can make new materials from these recycled materials. We use new materials made from recycled plastic inside cars because these materials are light and strong.



Go to pages 46–47 for activities.

7

Finding Materials

It can be very difficult to find materials, and many of them come from under the ground or underwater. How do we find and collect these materials?

Seeing Under the Ground

We find different minerals in different types of rock.

People called geologists study different rocks to find minerals in them. They also study rivers and oceans to see what minerals are in the water.

Other scientists use machines to measure how electricity and radio signals go through different rocks in the ground. They also use trucks that hit the ground, and then machines measure how the ground moves. This tells them about the rocks and minerals under the ground.

A Geologist



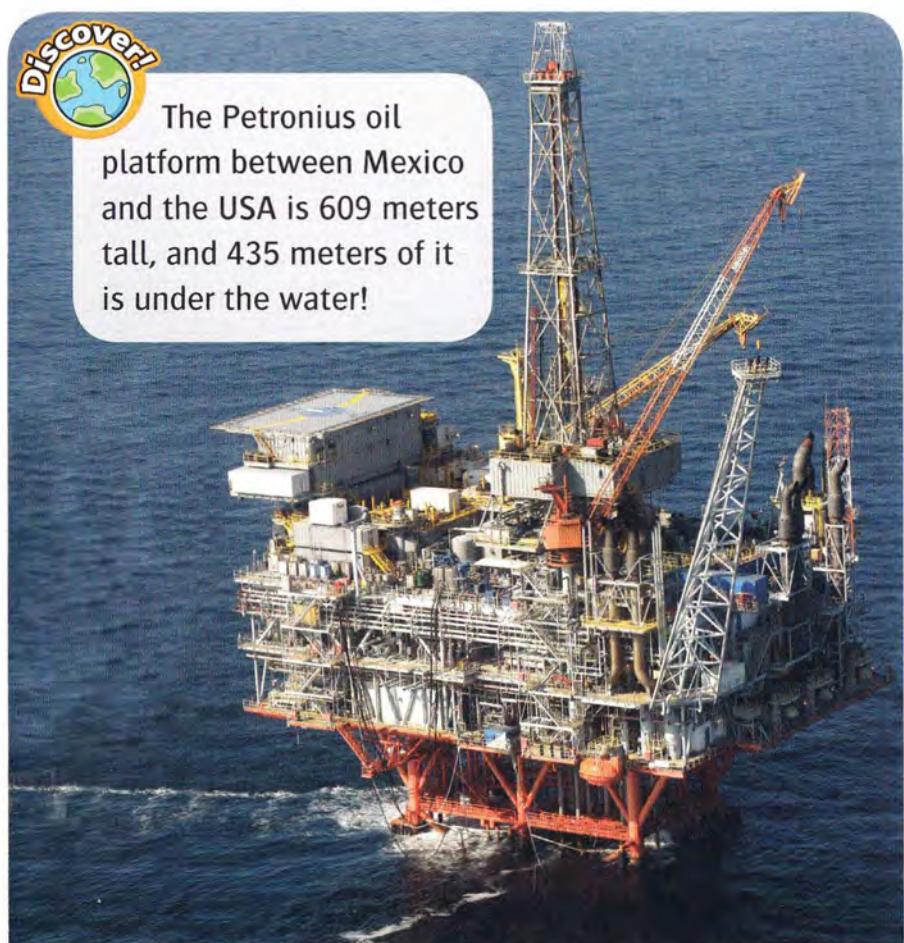
Drilling

Machines called drills make holes in the ground and collect small pieces of rock. Geologists study this rock to look for minerals. People also use drills to take oil from the ground. They make holes called oil wells, and they use pumps to take liquid oil from the ground.

People use oil platforms to get oil from under the ocean. Some platforms stand on big legs under the water. It's difficult to get the oil because the water is very deep and the weather can be bad, too.



The Petronius oil platform between Mexico and the USA is 609 meters tall, and 435 meters of it is under the water!



Mines

Coal is a black mineral that people burn for heat in homes or factories. People dig mines to get coal and other minerals like gold and diamonds.

Opencast mines are big holes in the ground. Huge digging machines take the rock from the mines.

Sometimes, people use dangerous chemicals called explosives to break the rocks.

Underground mines have tunnels deep under the ground. Miners work in the tunnels and cut the rock. It's very dangerous work because rocks can fall, and water or gas can get into the tunnels.



The world's deepest mines are in South Africa. Miners work more than 3.5 kilometers underground.



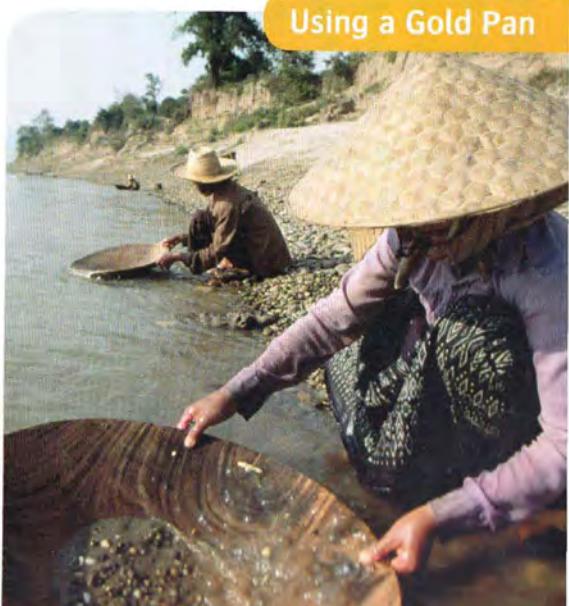
Evaporation Pools in San Francisco, USA

Water and Soil

Salt is a mineral that we use for cooking and lots of other things. People can get salt by putting sea water into pools. When it's sunny, the water evaporates, but the salt stays in the pool. Later, people collect the salt.

In some places there are gems or minerals in the soil. People use water to get them out of the soil.

To find gold, people put soil into a round object called a pan. When they wash the pan with water, the grains of gold go to the bottom of the pan.



Using a Gold Pan



Go to pages 48–49 for activities.

8

In the Future

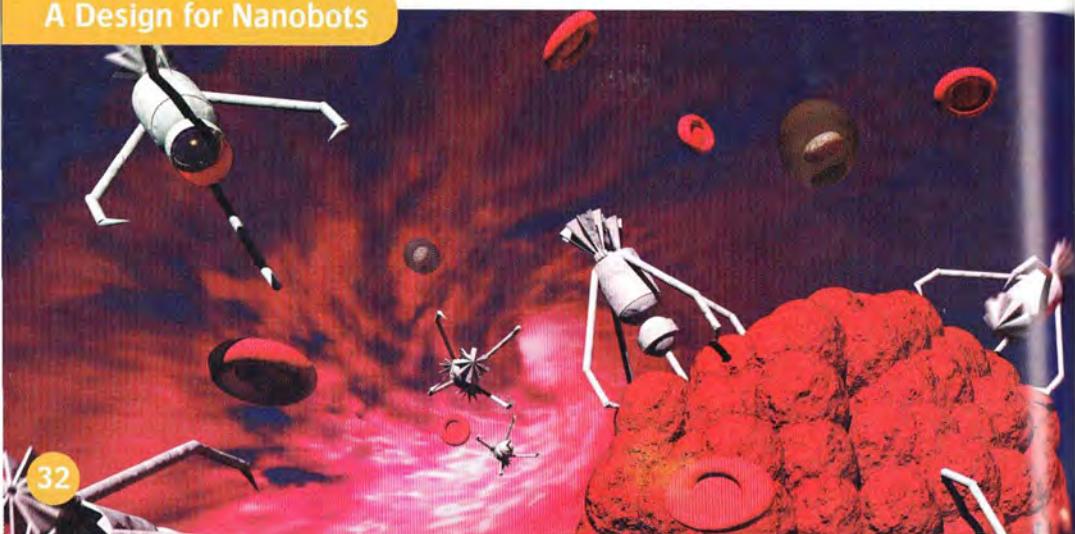
We are inventing new materials and new ways to use old materials all the time. What type of materials will we use in the future? What products will we make from them? What do you think?

Nanomaterials

All chemicals are made of tiny things called atoms. Now, scientists are making materials from tiny tubes, fibers, or balls of atoms. They are called nanomaterials. People will use nanomaterials to make computer parts and tiny machines called nanobots.

Nanobots will be smaller than grains of sand, but computers will control them. We will use them to build things and clean our cities. Maybe doctors will put nanobots inside sick people to repair their body.

A Design for Nanobots





Wearing Electronic Clothes

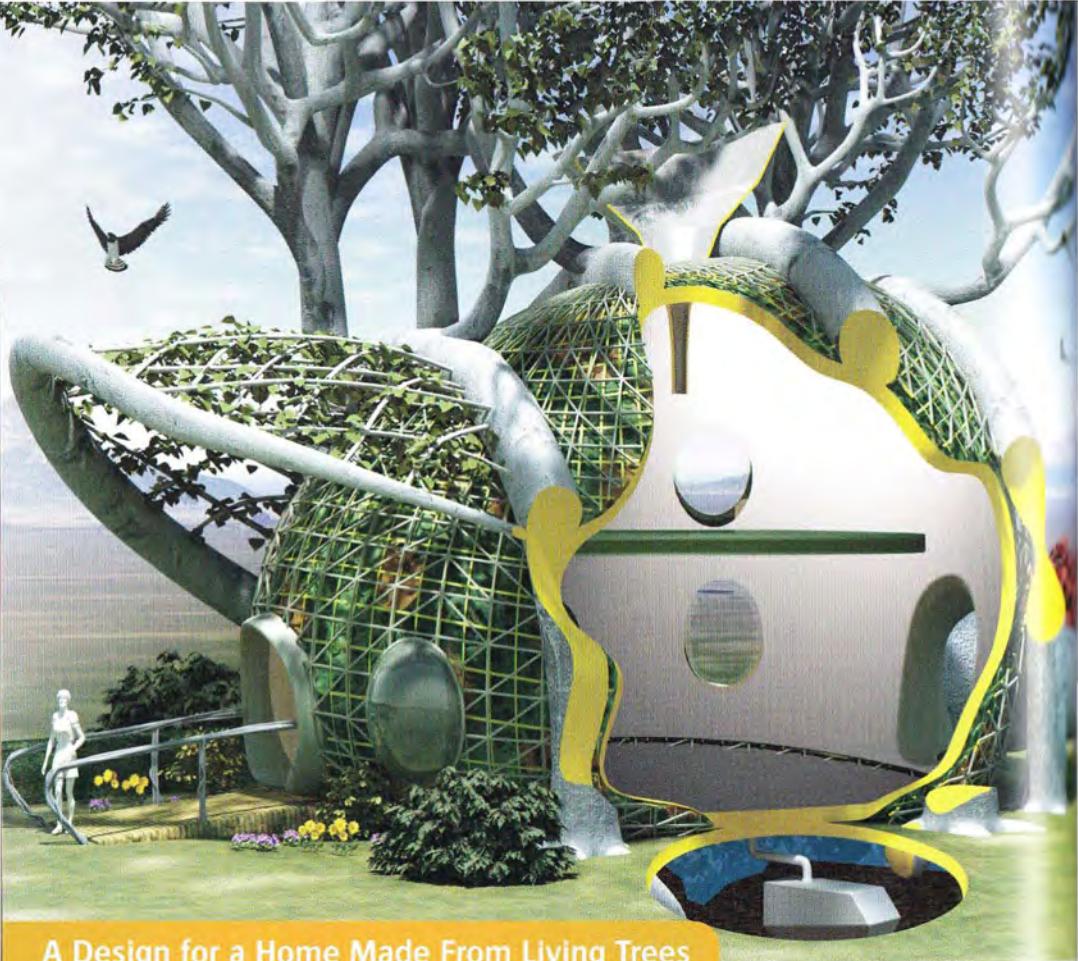
Electronic Fabric

Electronic fabric feels like normal fabric, but it has electrical parts and threads. Today some clothes have MP3 players in them. In the future, clothes will have phones or computers in them. They'll have screens on the arms for using the Internet.

Some types of electronic fabric will have fiber-optic threads or liquid crystals that can change color.

Imagine you're wearing a nice jacket, but it isn't the right color for your shoes. No problem – you'll push the buttons on your jacket and change the color.

Today, all football teams wear adverts on their shirts. In the future, the adverts will probably change during the match!



A Design for a Home Made From Living Trees

Living Objects

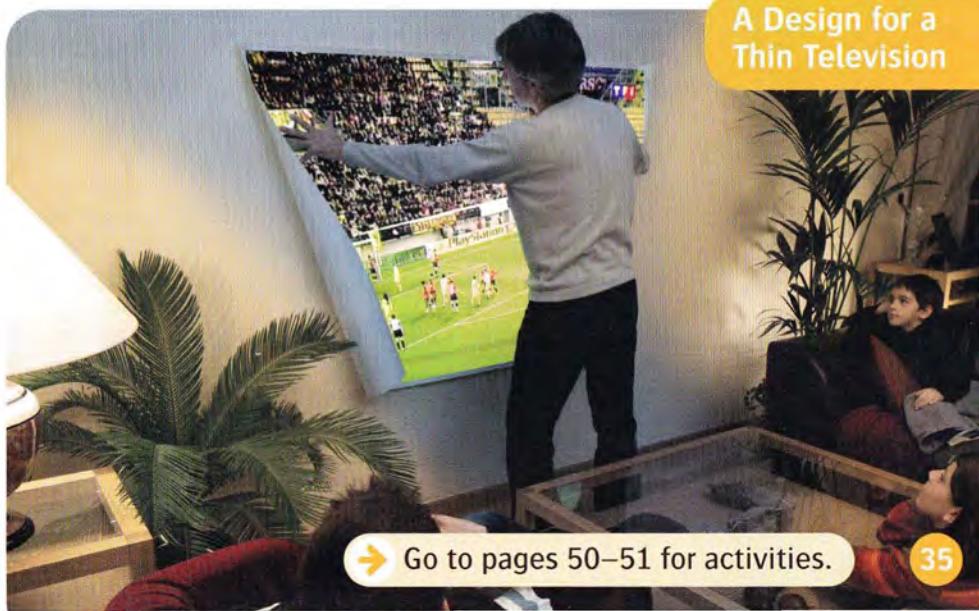
It's bad for our world to make too many materials like petrochemicals and metals because this produces waste and dangerous chemicals. In the future, we will grow more objects from living things like trees. Today, people grow objects like garden furniture from living trees. In the future, people will grow modern and comfortable homes from living things!

Changing Our World

The first people used materials like grass, rocks, and fur. Then, people learned how to make products from new materials like metals and glass. Later, people invented computers.

In the future, the properties of materials will be different, and they will help people to make amazing, new products. Maybe furniture will change color, and maybe our carpets and windows will produce electricity. When we tear our jeans, maybe nanobots in the fabric will repair the hole. Maybe televisions will be as thin as paper.

The first people hunted animals and lived in caves. Then, adobe bricks and metal tools changed the world – they helped people to build farms and to live together in cities. The materials and products of the future will change our world again.



A Design for a
Thin Television



Go to pages 50–51 for activities.

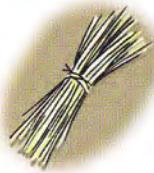
1

The First Materials

← Read pages 4–7.

1 Write the words.

stone wood bone fur grass metal



1 bone

2 _____

3 _____



4 _____

5 _____

6 _____

2 Complete the sentences.

weaving shelters forest smelting flint sticks

- 1 There are a lot of trees in a forest.
- 2 People made the first tools from a stone called _____.
- 3 We can use wood and plants to make _____ to sleep in.
- 4 We can make baskets by weaving thin _____.
- 5 We can make clothes by _____ threads.
- 6 We use a process called _____ to get metal out of rocks.

3 Find and write the words from pages 4–7.

1 two things that people made out of stone

temples

2 two things that you can make by weaving

3 two things that you can make with clay

4 a soft metal and a hard metal

4 Answer the questions.

1 What did early people use to make clothes?

They used animal fur and grass to make clothes.

2 What did they eat?

3 Why is clay good for cooking and keeping food?

4 When did people start to make bricks?

5 How did people make bronze?

6 What did people make from bronze and iron?

2

Rocks and Minerals

← Read pages 8–11.

1 Circle the correct words.

- 1 The Inca people used stones / **wedges** to break rocks.
- 2 We make jewelry with gems and metals / rocks.
- 3 Gems / Crystals are made of stones with a regular shape.
- 4 Rubies / Emeralds are red.
- 5 People make iron in a skyscraper / blast furnace.
- 6 People mix ore / steel with other chemicals to make iron.

2 Write *iron*, *steel*, *copper*, or *aluminum*.

This metal ...

- 1 is very soft. copper
- 2 is made with carbon and limestone. _____
- 3 is used to make planes. _____
- 4 is in a lot of skyscrapers. _____
- 5 is used to make statues. _____
- 6 is very light. _____
- 7 is made from iron. _____
- 8 is used to make electrical parts. _____

3 Write the words.

electricity statue jewelry cans liquid minerals

- 1 chemicals that you can find in rocks minerals
- 2 this is pretty and people wear it _____
- 3 your television uses this _____
- 4 something that moves like water _____
- 5 we put liquids in these _____
- 6 looks like a person and it's often made of metal _____

4 Write true or false.

- 1 Today, we usually use iron to make tools. false
- 2 The Inca people used gems to move stones. _____
- 3 All gem stones are crystals. _____
- 4 We use copper to make electrical parts because it's very light. _____
- 5 We can make metals from minerals in rocks. _____
- 6 Steel is a very soft metal. _____

5 Write about how we make steel. Use these words.

ore → carbon + limestone → blast furnace → heat →
liquid iron → + more chemicals → steel

3 Glass and Concrete

Read pages 12–15.

1 Complete the puzzle.

1 Long, thin fibers of glass are called ____.

2 Concrete with steel in it is called ____ concrete.

3 A ____ is a very tall building in a city.

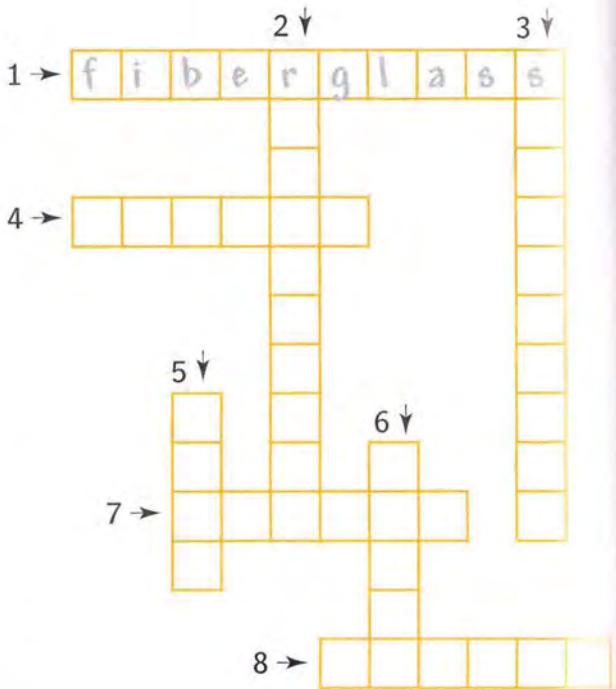
4 ____ is a material made from rock and clay.

5 We use a machine called a ____ to move liquid concrete.

6 A ____ is a tiny piece of material.

7 ____ things are not from the past.

8 To ____ something means to make or design something new.



2 Find and write the words from pages 12–15.

1 two types of buildings

2 two things that you can put in concrete

3 a person who makes things from glass

3 Write correct sentences.

1 The sand on many beaches is made of cement.

The sand on many beaches is made of silica.

2 Glass blowers blow water through a long, metal tube.

3 People forgot how to make glass for a long time.

4 Fiberglass is made of thin fibers of metal.

5 Concrete becomes hard when fibers grow inside it.

6 The dome of the Pantheon is made of stone.

4 Answer the questions.

1 What is special about the glass in some sunglasses?

2 Why do we use fiberglass in some clothes?

3 What do we mix with cement to make concrete?

4 Who made the first concrete buildings?

5 When did people invent modern concrete?

4

Materials That We Grow

← Read pages 16–19.

1 Write the words.

tire cotton curtains wool sheep boots



1 _____

2 _____

3 _____



4 _____

5 _____

6 _____

2 Number the sentences in order.

People use dyes to make the fabric different colors.

People use machines to wash the cotton.

Cotton grows on plants. 1

People make clothes with the fabric.

Machines pull the cotton into fibers.

Farmers collect the cotton.

Machines weave threads to make fabric.

Machines spin the cotton fibers into threads.

3 Complete the sentences.

- 1 Natural rubber comes from trees, but _____ rubber comes from chemicals. (tī'chūyē)
- 2 _____ are animals that live in the ocean. (tēr'yōs)
- 3 We make paper from a liquid called _____. (pēpē)
- 4 We use machines to _____ wool and cotton into threads. (nēsēpē)
- 5 _____ are colors that you can use with fabric. (yēdēs)
- 6 We use a type of paper called _____ to make boxes. (ōrdācadrb)

4 Answer the questions.

1 What things can we make from cotton?

2 Why is wool great for making sweaters?

3 When do oysters make pearls?

4 What did the Mayan people use natural rubber for?

5 What materials do people grow in your country?

5

Incredible Oil

← Read pages 20–23.

1 Write the words.

fertilizer refinery gas fuel temperature

- 1 something that isn't a liquid or a solid
- 2 something that you burn
- 3 where we get different chemicals from oil
- 4 farmers use this to help plants to grow
- 5 how hot something is

2 Complete the diagram.

detergent fertilizer paint plastic toys
nylon shirt polythene bag



3 Find and write the words from pages 20–23.

1 two things that you can use to make fibers

2 two things that you can make with nylon

3 two things that you can make by putting plastic into a mold

4 Complete the sentences.

1 We use gasoline to _____.

2 We use a mold to _____.

3 Plastic bags are bad for our world because _____.

4 Nylon is very strong. We _____.

5 When acrylic paints dry, _____.

5 Answer the questions.

1 What is oil made from?

2 How do we get different chemicals from oil?

3 What oil products do you use every day?

6

New Materials

← Read pages 24–27.

1 Complete the sentences.

screens Firefighters fishing rod
Microchips properties protect

- 1 We can use a _____ to catch fish.
- 2 _____ control computers.
- 3 We use liquid crystals to make pictures on television and computer _____.
- 4 Different materials have different _____.
- 5 _____ work in very hot places.
- 6 Special clothes _____ police officers from people with weapons.

2 Write correct sentences.

- 1 Liquid crystal glass is always transparent.

- 2 Composite materials are strong and heavy.

- 3 Doctors use liquid crystals to look inside people's bodies.

- 4 Silica aerogel is made mostly of water.

3 Complete the puzzle. Then write the secret word.

1 Computers have lots of tiny electrical ____.

2 We use ____ cables to send signals.

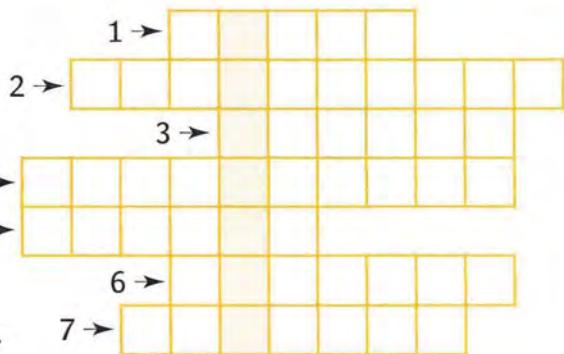
3 You can hit a tennis ball with a ____.

4 ____ control computers.

5 Liquid crystals can ____ color.

6 We can ____ materials and use them again.

7 ____ comes from sand.



The secret word is:



4 What do we use the materials for? Match.

1 silicon

2 aerogels

3 composite materials

4 fiber-optic cables

5 liquid crystals

to look inside people's bodies

to make pictures on screens

to make tiny parts for computers

to build planes

to insulate things

5 Answer the questions.

1 Why do we need to invent new materials?

2 Why are computers smaller now than in the past?

3 Why do we put composite materials in clothes?

7

Finding Minerals

← Read pages 28–31.

1 Write the words.

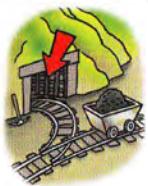
pool pan mine rocks oil platform geologist



1 _____

2 _____

3 _____



4 _____

5 _____

6 _____

2 Complete the sentences.

coal opencast drill miners evaporates legs

- When a liquid becomes a gas, it _____.
- You can _____ a hole in the ground to look for oil.
- Some oil platforms stand on _____.
- An _____ mine isn't under the ground.
- People burn _____ to heat their homes.
- Some _____ work in tunnels under the ground.

3 Match. Then write sentences.

Explosives

Coal

Radio signals

Gold

Salt

Soil

is a mineral that we burn for heat.

is a mineral that we use in cooking.

is in soil or rocks under the ground.

can have gems or minerals in it.

can travel through the ground.

are dangerous chemicals that we use in mines.

1 Explosives are dangerous chemicals that we use in mines.

2 _____

3 _____

4 _____

5 _____

6 _____

4 Answer the questions.

1 How do people get oil from the ground?

2 Why is it difficult to get oil from under the ocean?

3 Why is underground mining dangerous?

4 How do people find gold?

8

In the Future

← Read pages 32–35.

1 Complete the diagram.

fur clothes fiberglass bronze weapons concrete
nanobots electronic fabric flint tools steel
living homes petrochemicals grass clothes

The Past

fur clothes

The Present

The Future

2 Complete the sentences.

button adverts atoms furniture living feels

- 1 Animals and plants are _____ things.
- 2 Dad bought my desk from the _____ store in town.
- 3 I've lost a _____ on my jacket.
- 4 There are lots of _____ for products on television.
- 5 All chemicals are made of tiny things called _____.
- 6 Electronic fabric _____ like normal fabric.

3 Write *living objects, electronic clothes, or nanobots*.

- 1 They can change color. _____
- 2 They are very small machines. _____
- 3 They are good for our world. _____
- 4 They can repair things. _____
- 5 You can use living trees to make them. _____
- 6 They have electrical parts. _____
- 7 Scientists make them from atoms. _____

4 Answer the questions.

1 Why are petrochemicals bad for our world?

2 What have people made from living things?

3 What makes electronic clothes change color?

4 What are nanomaterials made from?

5 Which material do you think will change our world the most? Why?



Products in My Home

- 1 Choose ten materials from this book and find products made of these materials in your home.
- 2 Complete the chart.

What is the material?	What product is made of this material?	What do you use the product for?

- 3 Copy the chart and draw or add pictures of the materials and products.
- 4 Display your chart.



A Materials Timeline

- 1 Complete the timeline. Write about the materials and products.

10,000 years ago	About 10,000 years ago, people made adobe. They used adobe to build houses.
8,500 years ago	
5,000 years ago	
years ago	
years ago	
years ago	

- 2 Make a poster. Copy the timeline and draw or add pictures.
- 3 Display your poster.

Glossary

Here are some words used in this book, and you can check what they mean. Use a dictionary to check other new words.

advert information about a product that tries to make you want to buy the product

aluminum (or aluminium) a light, strong metal

ancient from thousands of years in the past

become to change into; to start to be

bone the hard part of your body that forms your skeleton

brick a man-made building material that is a rectangle with flat sides

bronze a hard metal

burn to make flames and heat

button a small, round thing on clothes or machines

cardboard very thick paper; boxes are made of this

carry to take something to another place

cement a building material

change to become different; to make something different

chemical a solid or liquid that is made by chemistry

comfortable nice to be in, for example, soft beds or chairs

concrete a building material usually made with cement, sand, stones, and water

control to make something work

cool to become colder; to make something colder

copper a soft, orange or yellow metal

cosmetic something that we put on our hair or skin to make it look nicer

crystal a solid chemical that has a regular shape, like a diamond

dangerous something that is bad for you or can make you sick

decompose to break down into small parts

destroy to break something or make it bad or weak

detergent a chemical that we use to clean things

die to stop living

dig to make a hole in the ground

electrical uses electricity

electricity a type of energy

energy we need energy to move and grow, and machines need energy to work

evaporate to change from liquid into gas

fabric a soft material that we use to make clothes

fertilizer a chemical that helps plants to grow

fiber something that looks like a thin string

fire when something burns

forest a place with a lot of trees

fuel something that we use to produce heat or energy

furniture things in a home, for example, a sofa or a bed

gas not a solid or liquid; like air

glass a hard material; you can make windows and bottles with it

gold an expensive, yellow metal

grain a tiny piece of something, like soil or sand

grass a green plant

ground the land that we stand on

grow to get bigger; to make something bigger

heat something that is hot; to make something hot

hole a space in something

huge very big

insulate to use a material to keep something warm or cold

invent to make or design something new

iron a type of metal

jewelry (or jewellery) pretty objects that we wear

LCD Liquid Crystal Display; a type of screen for computers and televisions that uses liquid crystals

liquid not a solid or a gas; like water

material something that we use to make other things

measure	to find out how big, small, or heavy something is	raise	to feed and take care of animals
metal	a hard material made from minerals	recycle	to use again
microchip	an electrical part that controls a computer	river	water on land that goes to the ocean
mine	a place with minerals	rock	a very hard, natural material
mix	to put more than one thing together	roof	the top part of a building
mixture	different things together	rubber	a material that you use to make tires
modern	not from the past	salt	a white mineral that comes from sea water, that we use for cooking
mold (or mould)	you put hot liquid into it to make objects with the same shape as the mold	screen	the front of a computer or television
move	to go from one place to another; to take something from one place to another	shape	for example, circle, square, triangle
MP3 player	a small machine that plays music	sheep (plural sheep)	an animal that we raise for wool and meat
natural	something that comes from nature; it's not made by people	shell	a hard cover on the outside of some animals
normal	usual; not different	soil	the ground that plants grow in
object	a solid thing that we can see	solid	not a liquid or a gas; like rock
ocean	the salt water that covers most of Earth	sort	to put the same things together
oil	a liquid from plants or animals that we use for cooking or to make gasoline	special	different from what is normal
petrochemical	something that we make from the chemicals that come from oil	spin	to make threads from fibers
plastic	a type of material that is made from chemicals and is man-made	steel	a very strong metal that's made from iron and other chemicals
pottery	things made from clay that are put into a fire	stick	a long, thin piece of a tree
print	to use a machine to put words or pictures onto paper	stone	a piece of rock
process	when things happen one after another	synthetic	made from chemicals by people
produce	to grow or make something	tear	to pull something into pieces
product	something that people make or use	temperature	how hot or cold something is
property	something that a material has, like being strong, soft, or transparent	temple	a religious building
protect	to keep safe from danger	thread	a long, thin string
pump	a machine that moves liquid	tiny	very small
push	to make something move away; the opposite of pull	tire (or tyre)	the thick, soft ring on a wheel, that's made of rubber
racket	you can hit a ball with this	tool	something that we use to do a job
radio signal	something that a radio gets when you listen to it	town	a place with a lot of buildings, larger than a village and smaller than a city
		transparent	you can see through it
		tube	a long, round thing that has a tunnel going through it
		waste	things that we throw away
		waterproof	can keep water out
		way	how to do something
		weapon	something that soldiers use when they fight
		weave	to push or pull threads over and under other threads
		wool	the soft, thick hair of a sheep



Oxford Read and Discover

Series Editor: Hazel Geatches • CLIL Adviser: John Clegg

Oxford Read and Discover graded readers are at four levels, from 3 to 6, suitable for students from age 8 and older. They cover many topics within three subject areas, and can support English across the curriculum, or Content and Language Integrated Learning (CLIL).

Available for each reader:

- Audio CD Pack (book & audio CD)
- Activity Book

For Teacher's Notes & CLIL Guidance go to
www.oup.com/elt/teacher/readanddiscover

Subject Area Level	The World of Science & Technology	The Natural World	The World of Arts & Social Studies
3 600 headwords	<ul style="list-style-type: none">• How We Make Products• Sound and Music• Super Structures• Your Five Senses	<ul style="list-style-type: none">• Amazing Minibeasts• Animals in the Air• Life in Rainforests• Wonderful Water	<ul style="list-style-type: none">• Festivals Around the World• Free Time Around the World
4 750 headwords	<ul style="list-style-type: none">• All About Plants• How to Stay Healthy• Machines Then and Now• Why We Recycle	<ul style="list-style-type: none">• All About Desert Life• All About Ocean Life• Animals at Night• Incredible Earth	<ul style="list-style-type: none">• Animals in Art• Wonders of the Past
5 900 headwords	<ul style="list-style-type: none">• Materials to Products• Medicine Then and Now• Transportation Then and Now• Wild Weather	<ul style="list-style-type: none">• All About Islands• Animal Life Cycles• Exploring Our World• Great Migrations	<ul style="list-style-type: none">• Homes Around the World• Our World in Art
6 1,050 headwords	<ul style="list-style-type: none">• Cells and Microbes• Clothes Then and Now• Incredible Energy• Your Amazing Body	<ul style="list-style-type: none">• All About Space• Caring for Our Planet• Earth Then and Now• Wonderful Ecosystems	<ul style="list-style-type: none">• Helping Around the World• Food Around the World

For younger students, **Dolphin Readers** Levels Starter, 1, and 2 are available.

